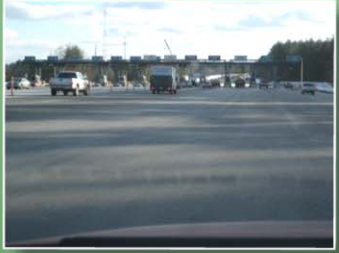
F.E. Everett Turnpike Tolling Study

Traffic and Revenue Analysis Final Report



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Bureau of Turnpikes

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November 30, 2010

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CHAPTER 1

INTRODUCTION

A new connection from the F.E. Everett Turnpike to U.S. 3, N.H. 3A and the Manchester Boston Regional Airport is currently under construction. This new roadway, designated as the Manchester Airport Access Road (MAAR), will have traffic impacts on the Everett Turnpike and other major roads in the Merrimack/Bedford/Manchester corridor. The MAAR has the potential to result in a significant negative toll revenue impact at the existing Bedford Mainline Plaza. The negative impacts at the Bedford mainline toll plaza would be a result of the following two conditions:

- Traffic to and from the south on the Everett Turnpike that currently travels to the Manchester Boston Regional Airport passes through the Bedford mainline toll plaza. Once the MARR is open, these same trips will not pass through the Bedford mainline toll plaza as the ramps to and from the MAAR for these trips are south of the mainline plaza. Traffic would also be able to use the MAAR to connect to Brown Avenue and continue north without having to pay the Bedford Mainline toll.

- Non-airport traffic will be able to divert around the Bedford mainline toll plaza. Vehicles heading north on the Everett Turnpike that are south of the MAAR could take the northbound to eastbound exit to the MAAR, reverse direction on the ramp system, and take the westbound to northbound ramp from the MAAR to continue heading north on the Everett Turnpike. Vehicles heading south on the Everett Turnpike that are north of the MAAR can evade the existing Bedford Mainline Toll Plaza by first taking the southbound to eastbound exit ramp to the MAAR, reverse direction on the ramp system, and then take the westbound to southbound loop ramp to continue heading south on the Everett Turnpike.

Because of their close proximity, the opening of the MAAR will not only impact the Bedford Mainline Toll Plaza, but also the usage of the ramp tolls at Exit 12, and to a much lesser degree at Exit 11. Traffic that now enters or exits at the Exit 12 ramp toll plazas and pays the $0.50 toll will be able to utilize the MARR ramps to access U.S. 3 without paying a toll.

This report discusses why the location of the MAAR will have such an impact on the existing mainline toll plaza in Bedford and to a lesser extent at Exits 11 and 12. This report also presents the results from an evaluation of eleven tolling alternatives on the Everett Turnpike, extending from Nashua to the existing Bedford mainline toll plaza. These alternative scenarios are aimed at recapturing the loss in toll revenue that can be expected due to the MAAR.

In addition, a retail development is proposed to be constructed in the northwest quadrant of Exit 10 of the Everett Turnpike. The development will be approximately 500,000 square feet and will include retail stores, a hotel and restaurants. It is presently scheduled to open in 2012. It has been suggested that, in conjunction with this development, it may be possible to remove the ramp tolls at Exit 11 and Exit 12. The potential traffic and revenue impacts of this action were also analyzed in this study. The potential removal of the ramp tolls from Exit 12 under such as scenario will also affect operations at the Bedford mainline plaza. This report also addresses these “cross-impacts”, and the feasibility of eliminating one or more of the Merrimack ramp toll plazas.

SCOPE OF STUDY

The study area extends north from the Massachusetts border on the Everett Turnpike to the I-293 and Route 101 interchange and west from State Highway 101 to I-93, as shown on Figure 1-1. The traffic and revenue impacts with the MAAR under eleven alternative tolling scenarios were analyzed. In addition, traffic and revenue projections were made for a No Build (MAAR not implemented) condition assuming that the MAAR is not constructed and the Bedford and ramp toll plazas at Exits 10, 11, and 12 remain as they currently exist. The No Build (MAAR not implemented) condition serves as the baseline to compare all other scenarios against. In addition to the eleven tolling scenarios, traffic and revenue projections were developed assuming the build and no-build situations for the proposed commercial development at Exit 10, with and without ramp tolls at Exits 11 and 12. Finally, the cross-impacts of removing the ramp tolls at Exits 11 and 12 with the implementation of the MARR were evaluated. Estimates of capital, operations and maintenance costs were developed for each of the alternative scenarios to estimate the net revenue potential of each scenario.

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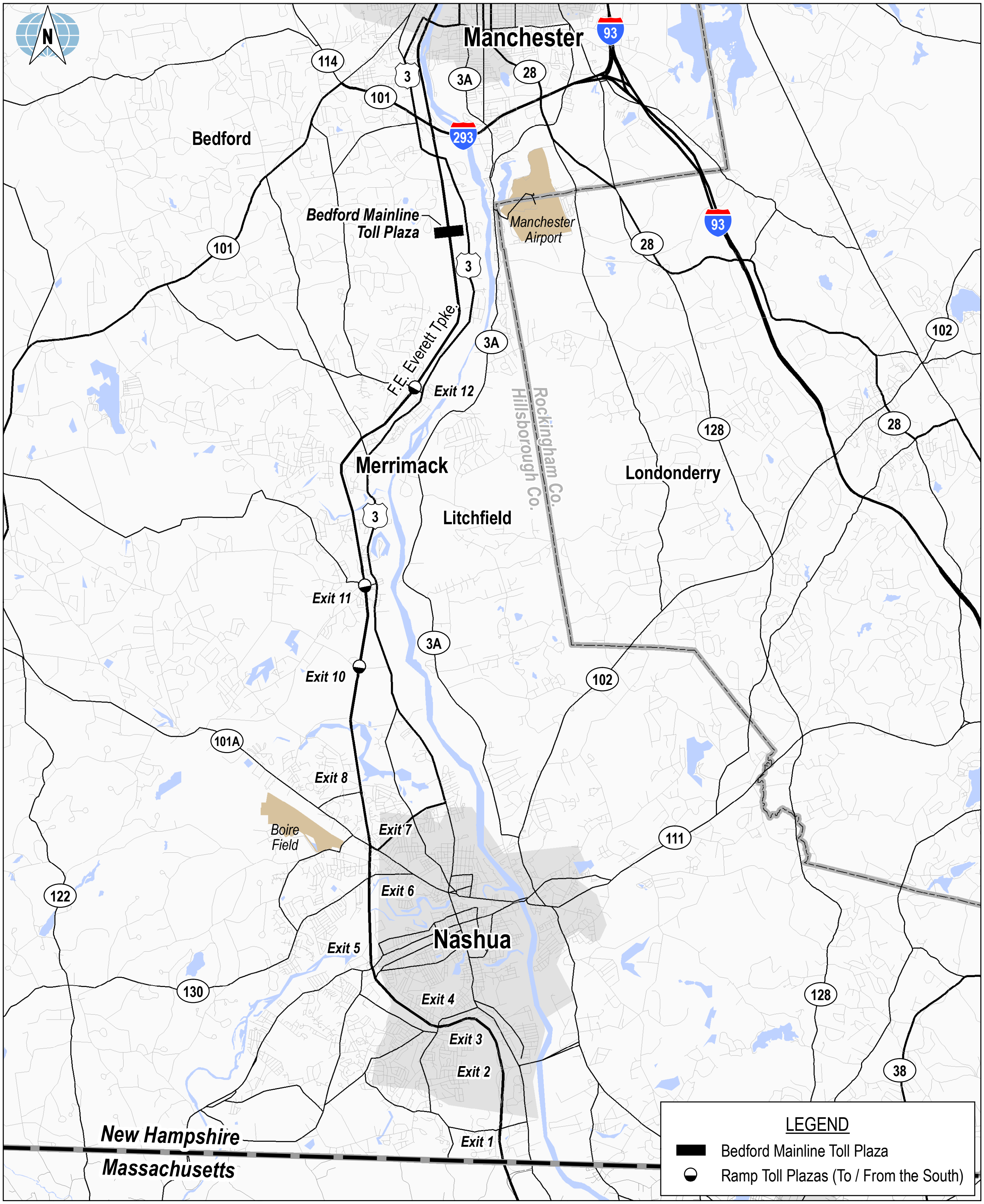


WilburSmith
ASSOCIATES

STUDY AREA

FIGURE 1-1

SCENARIO DESCRIPTIONS

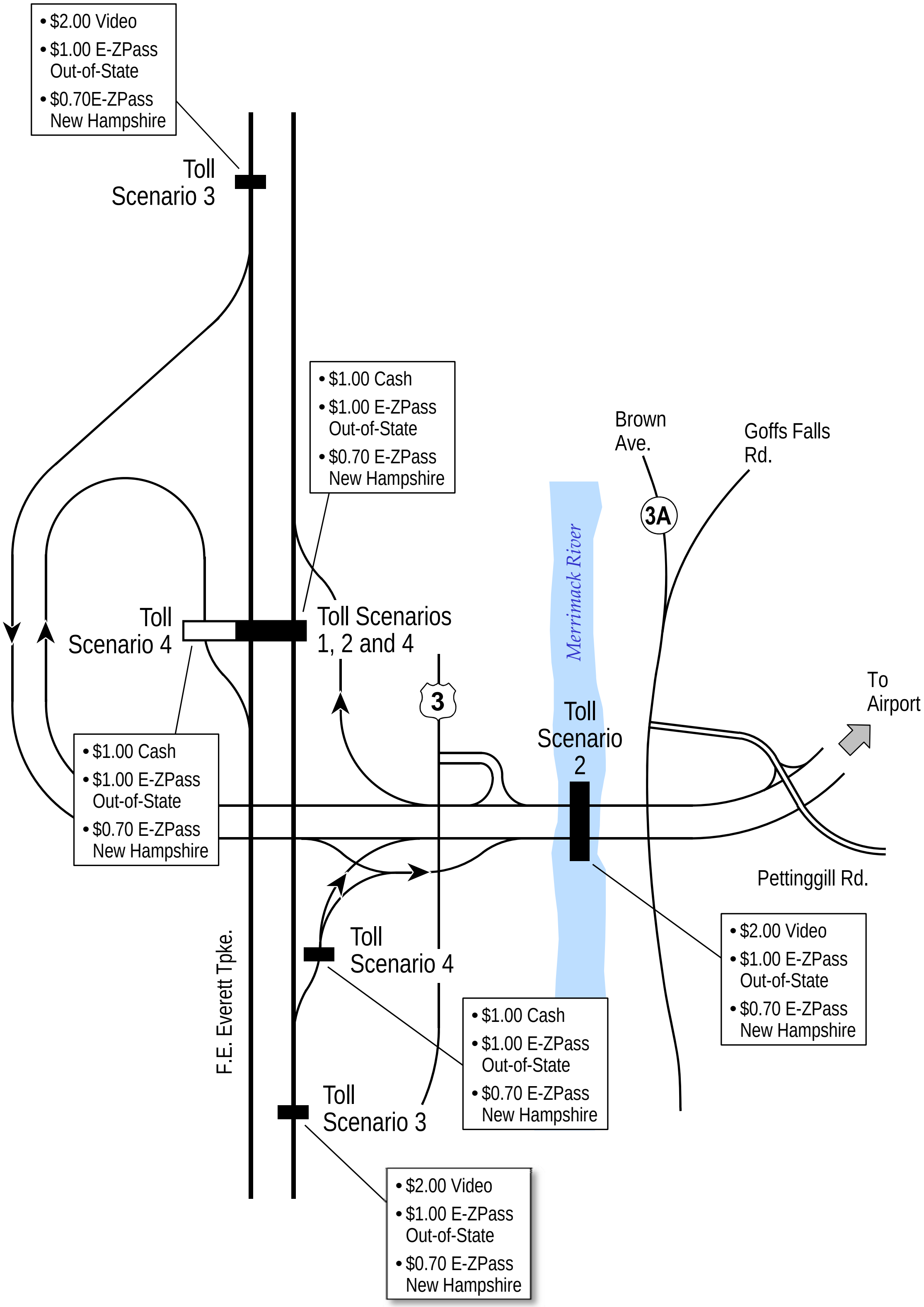
Detailed descriptions of the various scenarios, alternative analyses for the Exit 11 and Exit 12 toll removal scenarios, and the cross-impact evaluations are presented below.

Bedford Scenarios (See Figure 1-2)

- **Scenario 1** - In this scenario, there would be no tolls on the MAAR after it is opened and the Bedford Mainline Toll Plaza would remain as it is today. The ramp tolls at Exits 10, 11, and 12 would also remain.
- **Scenario 2** - A new all electronic toll (AET) plaza, collecting tolls in both directions, would be located at the new bridge over the Merrimack River on the MAAR. The existing Bedford Mainline Toll Plaza would remain in place. The ramp tolls at Exits 10, 11, and 12 would also remain.
- **Scenario 3** - The existing Bedford Mainline Toll Plaza would be removed. Northbound tolls would be collected at a new AET plaza just south of the northbound to eastbound exit ramp of the MAAR. Southbound tolls would be collected at a new AET plaza just north of the southbound to eastbound exit ramp of the MAAR. There would be no tolls on the MAAR. The ramp tolls at Exits 10, 11, and 12 would also remain.
- **Scenario 4** - The existing Bedford Toll Plaza would remain as it is and two ramp tolls would be added - one on the northbound to eastbound exit ramp of the MAAR and the other on the westbound exit loop ramp of the MAAR to southbound on the Everett. As an alternative option, if this was not feasible, the existing Bedford Mainline Toll Plaza could be relocated just south of the MAAR. Tolls would be collected in both directions. There would be no tolls on the MAAR. The ramp tolls at Exits 10, 11, and 12 would also remain.

Toll Removal at Exits 11 and 12 - In addition to the Bedford Toll Scenarios, a toll removal analysis at Exits 11 and 12 was performed for three conditions.

- **Alternative 1 – MAAR Opens, Tolls Remain** - Under this condition, the 500,000 square-foot mall development in the vicinity of Exit 10 would not be built and the ramp tolls would remain at Exits 10, 11, and 12.
- **Alternative 2 – MAAR Opens, Mall Build Condition, Tolls Remain** - The 500,000 square-foot mall development would be built and


• $2.00 Video
• $1.00 E-ZPass Out-of-State
• $0.70E-ZPass New Hampshire
Toll Scenario 3
• $1.00 Cash
• $1.00 E-ZPass Out-of-State
• $0.70 E-ZPass New Hampshire
Brown Ave.
Goffs Falls Rd.
3A
Merrimack River
Toll Scenario 4
Toll Scenarios 1, 2 and 4
3
Toll Scenario 2
To Airport
• $1.00 Cash
• $1.00 E-ZPass Out-of-State
• $0.70 E-ZPass New Hampshire
Pettinggill Rd.
• $2.00 Video
• $1.00 E-ZPass Out-of-State
• $0.70 E-ZPass New Hampshire
F.E. Everett Tpke.
Toll Scenario 4
• $1.00 Cash
• $1.00 E-ZPass Out-of-State
• $0.70 E-ZPass New Hampshire
Toll Scenario 3
• $2.00 Video
• $1.00 E-ZPass Out-of-State
• $0.70 E-ZPass New Hampshire

BEDFORD TOLL SCENARIOS

FIGURE 1-2

opened in 2012 and the ramp tolls would remain at Exits 10, 11, and 12.

- **Alternative 3 – MAAR Opens, Mall Build Condition, Toll Removal** - The 500,000 square-foot mall development would be built and opened in 2012. Ramp toll plazas at Exits 11 and 12 would be removed in conjunction with the mall opening. Ramp tolls would remain at Exit 10.

Cross-Impacts of Bedford and Toll Removal Scenarios - Since there are important relationships between the Bedford Mainline and the ramp plazas at Exit 10, 11, and 12, the cross-impacts of the Bedford tolling scenarios with the potential toll removal at Exits 11 and 12 were evaluated. For example, the Exit 12 ramp plaza currently provides diversion protection to the Bedford mainline plaza. Removing Exit 12 ramp tolls would likely result in a negative revenue impact at the Bedford mainline since users could utilize the toll free Exit 12 to divert around the Bedford Mainline toll plaza. The magnitude of these impacts differs among the various Bedford Scenarios analyzed. Cross-impacts were estimated under the following Scenario 1 and Scenario 4 conditions:

- **Scenario 1A** - This assumes the MAAR is opened in 2012, the Bedford Toll Plaza remains as it is today, the Mall development is not built, and the ramp tolls remain at Exits 10, 11 and 12.

- **Scenario 1B** - This assumes the MAAR is opened in 2012, the Bedford Toll Plaza remains as it is today, the Mall development is built and opened in 2012, and the ramp tolls remain at Exits 10, 11 and 12.

- **Scenario 1C** - This assumes the MAAR is opened in 2012, the Bedford Toll Plaza remains as it is today, the Mall development is built and opened in 2012, and the ramp tolls are removed at Exits 11 and 12, but will remain at Exit 10.

- **Scenario 4A** - This assumes the MAAR is opened in 2012, the Bedford Toll Plaza remains as it is and tolls are placed on the MAAR ramps to and from the south, the Mall development is not built, and the ramp tolls remain at Exits 10, 11 and 12.

- **Scenario 4B** - This assumes the MAAR is opened in 2012, the Bedford Toll Plaza remains as it is and tolls are placed on the MAAR ramps to and from the south, the Mall development is built, and the ramp tolls remain at Exits 10, 11 and 12.

- **Scenario 4C** - This assumes the MAAR is opened in 2012, the Bedford Toll Plaza remains as it is and tolls are placed on the MAAR ramps to and from the south, the Mall development is built, and the ramp tolls are removed at Exits 11 and 12, but will remain at Exit 10.

For each of the above six cross-impact conditions, estimates of toll transactions, gross toll revenue, operations and maintenance costs, and net revenue were developed.

Following the analysis of the above four scenarios and cross impacts, the study scope was expanded to include the following seven additional scenarios:

Relocation Scenarios (See Figure 1-3) - For all the following scenarios, the mall is assumed to be opened:

- **Scenario 5** - In this scenario, the Bedford Mainline Toll Plaza and the ramp plazas at Exit 12 would be removed. A new open road tolling plaza would be constructed along the mainline at Exit 11. The ramp tolls to and from the south at Exit 10 and 11 would remain.

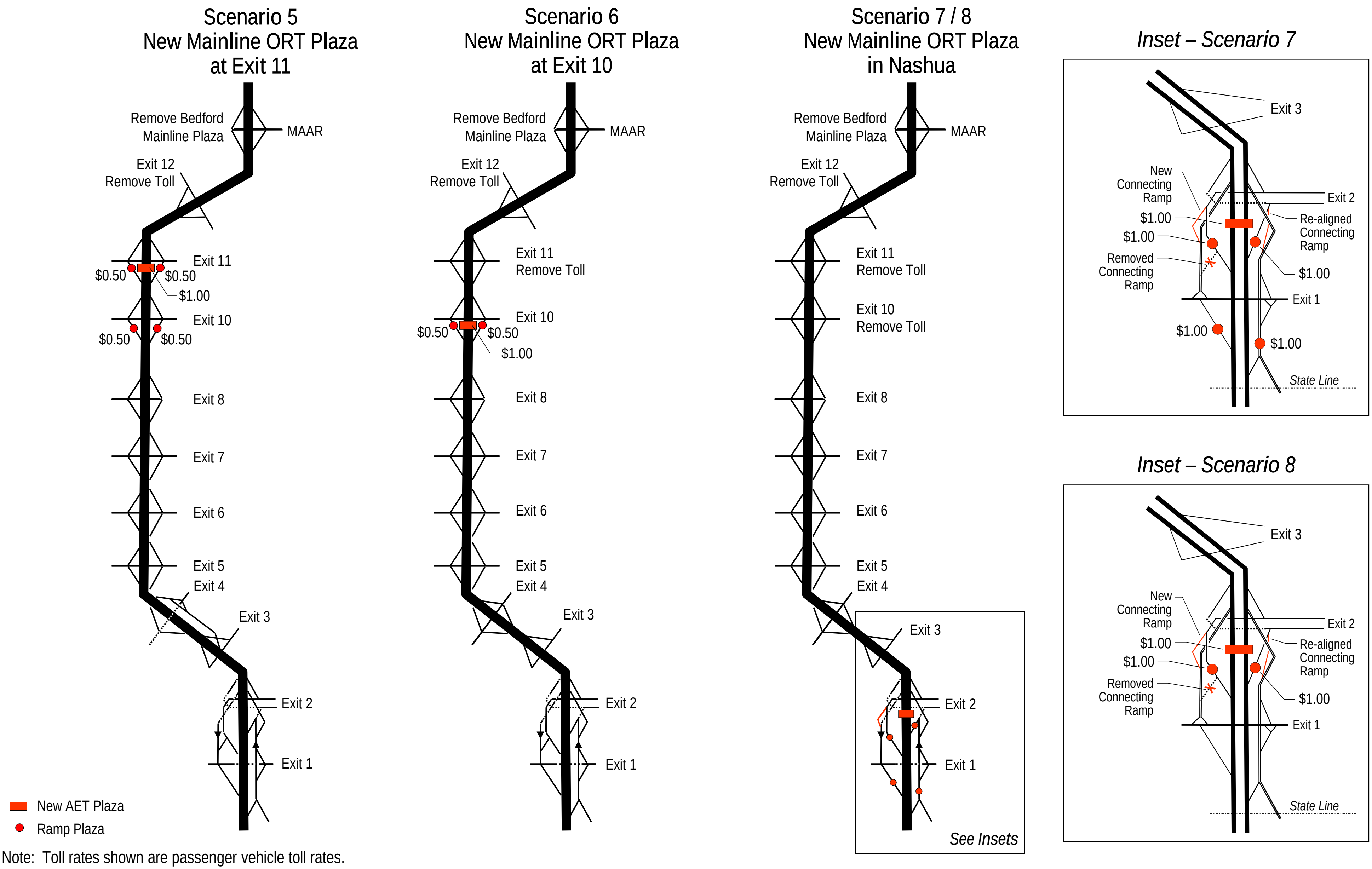
- **Scenario 6** - In this scenario, the Bedford Mainline Toll Plaza and the ramp plazas at Exits 11 and 12 would be removed. A new open road tolling plaza would be constructed along the mainline at Exit 10. The ramp tolls to and from the south at Exit 10 would remain.

- **Scenario 7** - In this scenario, the Bedford Mainline Toll Plaza and the ramp plazas at Exits 10, 11, and 12 would be removed. A new open road tolling plaza would be constructed in Nashua between Exits 1 and 2. In addition, a toll would be placed on the ramps to and from the south at Exits 1 and 2.

- **Scenario 8** – In this scenario, the Bedford Mainline Toll Plaza and the ramp plazas at Exits 10, 11, and 12 would be removed. A new open road tolling plaza would be constructed in Nashua between Exits 1 and 2. In addition, a toll would be placed on the ramps to and from the south at Exit 2.

All Electronic Toll (AET) Scenarios (See Figure 1-4) - For all the following scenarios, the mall is assumed to be opened:

- **Scenario 9** – This scenario is identical to Scenario 6 except that the tolling location would operate as a cashless system. Vehicles without a transponder would have their license plate captured by video and post



Scenario 5
New Mainline ORT Plaza
at Exit 11

Scenario 6
New Mainline ORT Plaza
at Exit 10

Scenario 7 / 8
New Mainline ORT Plaza
in Nashua

Inset – Scenario 7

Inset – Scenario 8

🟥 New AET Plaza
● Ramp Plaza

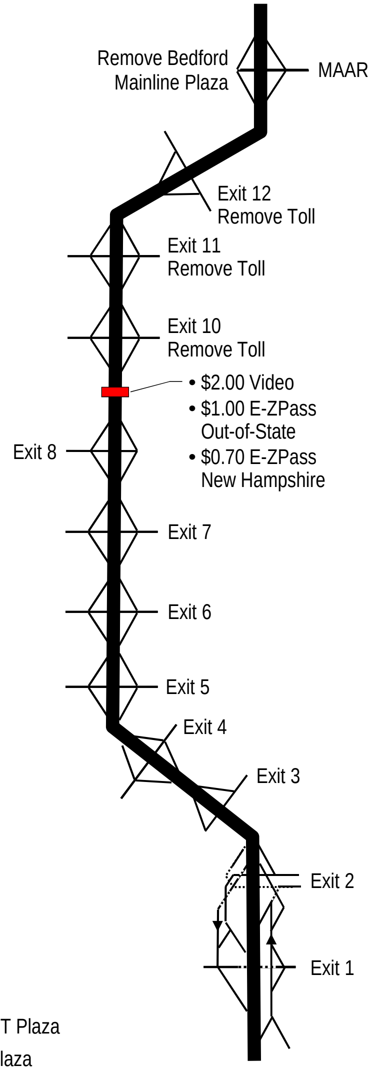
Note: Toll rates shown are passenger vehicle toll rates.
New Hampshire E-ZPass discounts for passenger vehicles are assumed to be 30% of base rate.

WilburSmith ASSOCIATES

RELOCATION SCENARIOS

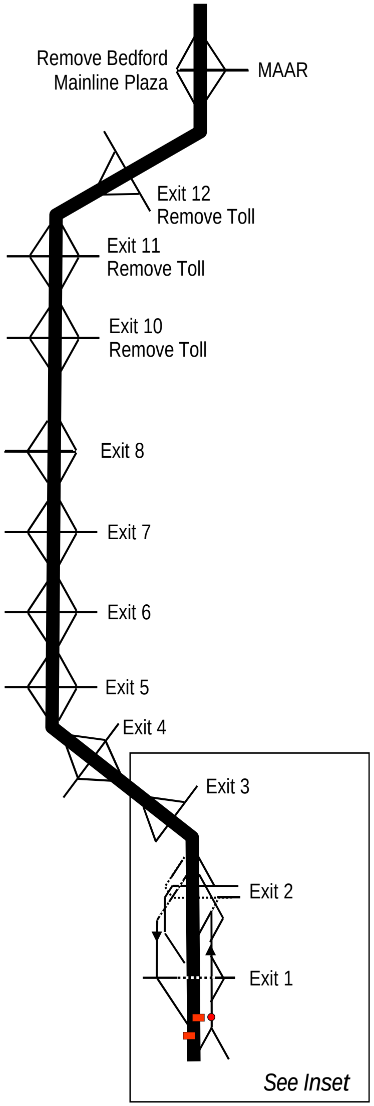
FIGURE 1-3

Scenario 9
New Mainline AET Plaza South of Exit 10

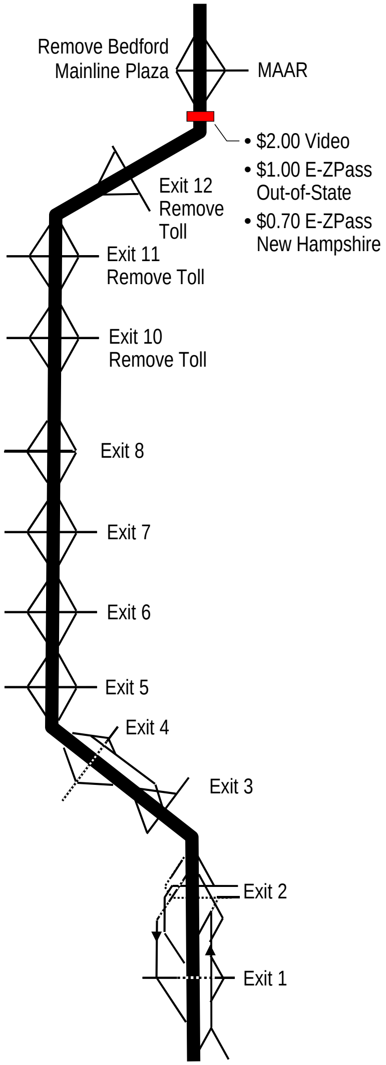


- $2.00 Video
- $1.00 E-ZPass Out-of-State
- $0.70 E-ZPass New Hampshire

Scenario 10
New Mainline AET Plaza and Ramp Plaza in Nashua

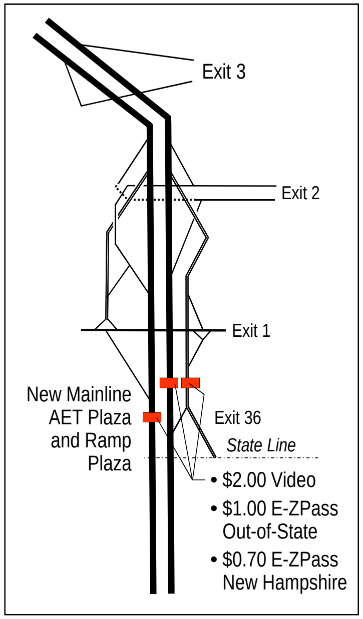


Scenario 11
New Mainline AET Plaza South of MAAR



- $2.00 Video
- $1.00 E-ZPass Out-of-State
- $0.70 E-ZPass New Hampshire

Inset – Scenario 10



- $2.00 Video
- $1.00 E-ZPass Out-of-State
- $0.70 E-ZPass New Hampshire

🟥 New AET Plaza
● Ramp Plaza

Note: Toll rates shown are passenger vehicle toll rates.

AET SCENARIOS

FIGURE 1-4

billed. A $1.00 surcharge in addition to the base toll rate was assumed for video users.

- **Scenario 10** - This scenario is identical to Scenario 7 except that the tolling location would operate as a cashless system. Vehicles without a transponder would have their license plate captured by video and post billed. A $1.00 surcharge in addition to the base toll rate was assumed for video users.

- **Scenario 11** – This scenario assumes a new AET location just south of the MAAR and also assumes that the existing Bedford mainline and the ramp plazas at Exits 10, 11, and 12 are removed.

TRAFFIC DEMAND MODELING

Figure 1-5 presents an overview of the methodology used to develop estimates of traffic and revenue for the project alternatives. A traffic and revenue study attempts to answer the following four overall questions:

- What is the current level of traffic demand in the corridor?
- How much will the demand grow in the future?
- What share of traffic can be expected to use the toll facility?
- What will drivers be willing to pay?

The overall modeling approach used in the study required the enhancement and utilization of two travel demand models:

- **Southern New Hampshire Regional Planning Commission (SNHPC) Regional Travel Demand Model** (1)

- **Nashua Regional Planning Commission (NRPC) Travel Demand Model** (2)

The models were obtained from the regional planning authorities and adjusted to reflect the Manchester Airport Access Road, the planned Merrimack Premier Outlet Center and the changes in tolling locations for the various alternatives.

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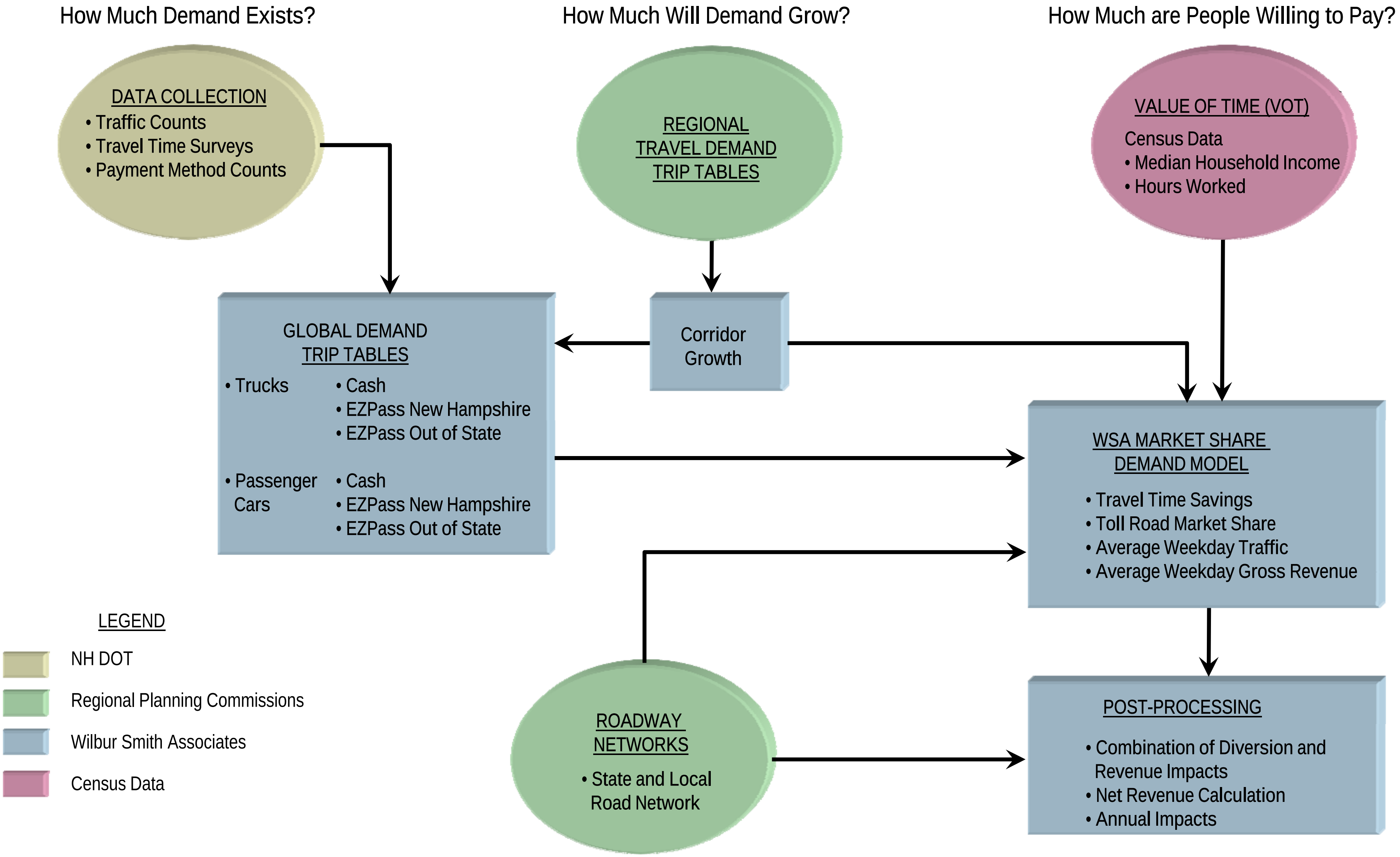
(1) SNHPC travel demand model for 2005 and 2017 time horizons; Obtained 01/19/2010 from the Southern New Hampshire Planning Commission..

(2) NRPC travel demand model for 2002 and 2025 time horizons; Obtained 01/19/2010 from the Nashua Regional Planning Commission.



How Much Demand Exists?

How Much Will Demand Grow?

How Much are People Willing to Pay?

DATA COLLECTION
- Traffic Counts
- Travel Time Surveys
- Payment Method Counts

REGIONAL TRAVEL DEMAND TRIP TABLES

VALUE OF TIME (VOT)

Census Data
- Median Household Income
- Hours Worked

GLOBAL DEMAND TRIP TABLES

• Trucks	• Cash • EZPass New Hampshire • EZPass Out of State
• Passenger Cars	• Cash • EZPass New Hampshire • EZPass Out of State

Corridor Growth

WSA MARKET SHARE DEMAND MODEL
- Travel Time Savings
- Toll Road Market Share
- Average Weekday Traffic
- Average Weekday Gross Revenue

ROADWAY NETWORKS
- State and Local Road Network

POST-PROCESSING
- Combination of Diversion and Revenue Impacts
- Net Revenue Calculation
- Annual Impacts

LEGEND

🟨 NH DOT

🟩 Regional Planning Commissions

🟦 Wilbur Smith Associates

🟪 Census Data

WilburSmith
ASSOCIATES

MODELING APPROACH

FIGURE 1-5

The travel demand models are the basis to identify changes in travel times on different segments of the road network under various alternative project configurations. Motorists' willingness to pay a toll to use the toll road depends heavily on time savings versus the toll-free paths in the adjacent road network. The demand modeling is representative of average weekday conditions. The traffic and toll revenue forecasts presented later in this report assume a certain fixed percentage of traffic and revenue will occur during the weekends.

Base year 2010 and future-year (2012 and 2017) traffic assignments, using the two regional models, were made to identify potential changes in travel patterns in the corridor. Among other things, these travel patterns are likely to be affected by:

- Forecast growth in the region;
- The addition of the Manchester Airport Access Road (MAAR); and
- Implementation of the Merrimack Premier Outlet Center.

The market-share model was updated to include network configurations for the various tolling scenarios that were used to estimate traffic and revenue for the various combinations of project configuration, sensitivity to changes in growth of demand, and/or changes in tolling operation.

During the assignment process, travel time between a path using the tolled F. E. Everett Turnpike was compared to travel time on a path using the next best free routes (most likely Daniel Webster Highway). For each travel movement, the proportion of motorists expected to use the toll road is a function of the computed time savings and the cost to use the tolled path vs. the value placed on time savings by the motorist value of time (VOT). The demand model relies on developing an equilibrium condition between the toll cost and the estimated time savings.

The median value of time was derived from census data describing median household income as well as hours worked per household and was estimated at $0.24 per minute or $14.40 per hour for 2012 levels. Truck traffic was assumed to have a value of time twice as high as passenger cars.

VEHICLE CATEGORIES

The travel demand model data was refined to reflect the various shares of method of payment in the trip tables and were therefore separated into six components:

- Trucks paying cash;
- Trucks with E-ZPass registered in New Hampshire;

- Trucks with E-ZPass from out of state;
- Passenger cars paying cash;
- Passenger cars with E-Z Pass registered in New Hampshire; and
- Passenger cars with E-ZPass from out of state.

The split of the original demand matrices into these six categories was performed on basis of transaction data provided by NHDOT for the relevant plazas for Fiscal Year 2009. Based on assumptions for other forecasts provided to NHDOT (3), an increase of E-ZPass shares over time for passenger cars was assumed. These vehicle categories were assigned simultaneously until an equilibrium condition was reached for the respective toll rate. The E-ZPass shares for trucks were assumed to remain at the current levels due to the already high market penetration. Table 1-1 shows the various shares of the vehicle categories for the travel demand trip tables.

The model data was processed separately for both jurisdictions and the effects of the MAAR and/or removing tolls at Exits 11 and 12 were combined in a post processing step.

METHODOLOGY

Normal routing and toll evasion routes were identified for each scenario. Travel times and distances were also calculated for comparison purposes. Routing, travel times and distances were also developed for the three analysis situations at Exits 10, 11, and 12 (existing; mall open and ramp tolls remaining; and mall open and ramp tolls removed). The traffic results from each of the model runs were examined and evaluated for reasonableness, taking into account the routing, travel times and distances.

For each scenario, projections of traffic and gross toll revenues were prepared and compared. Capital, operation and maintenance cost estimates were prepared and used to calculate net toll revenue for each scenario.

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(3) Jacobs Engineering Group Inc., New Hampshire Turnpike System Traffic and Revenue Study, November 2009, page 75

Table 1-1
Assumptions for Shares of Vehicle Types in the Travel Demand Model

Passenger Cars (1)

Fiscal Year	EZPass New Hampshire	EZPass Out-Of-State	Total EZPass PC	Cash	Total Share PC
2009	50.8%	9.7%	60.4%	34.3%	94.7%
2012	53.3%	10.2%	63.4%	31.3%	94.7%
2017 (1)	54.4%	10.4%	64.8%	30.0%	94.7%

Trucks (2)(3)

Fiscal Year	EZPass New Hampshire	EZPass Out-Of-State	Total EZPass Truck	Cash	Total Share Trucks
2009	2.0%	2.4%	4.4%	0.9%	5.3%
2012	2.0%	2.4%	4.4%	0.9%	5.3%
2017 (1)	2.0%	2.4%	4.4%	0.9%	5.3%

Note:
(1) Passenger cars defined as vehicle classes 1 through 4 of the current toll rate schedule.
(2) Trucks defined as vehicle classes 5 through 12 of the current toll rate schedule.
(3) Due to already high share of EZPass users, the share of EZPass among trucks was assumed to remain constant over time.

REPORT STRUCTURE

- Chapter 2 presents a description of the existing toll system along the F.E. Everett Turnpike, including historical traffic and revenue at the Bedford mainline plaza and at the Exit 10, 11, and 12 ramp toll plazas. A description of the MAAR is also provided and the traffic and toll revenue issues that can be expected when it is opened. Finally, an evaluation and discussion of a No Build (MAAR not implemented) condition and Scenarios 1, 2, 3, and 4 are presented.

- Chapter 3 discusses the ramps toll plazas located at Exits 10, 11, and 12 and the Mall development planned in the vicinity of Exit 10. An evaluation of toll removal impacts at Exits 11 and 12 was performed and the findings are presented.

- Chapter 4 discusses the cross impacts involving the Mall build assumptions and Exit 11 and 12 ramp removal with Scenario 1 and Scenario 4. In addition, capital, operation and maintenance costs were estimated.

- Chapter 5 presents the results of Scenarios 5, 6, 7, and 8, including traffic, gross toll revenue, operation and maintenance costs, preliminary capital cost estimates, and net toll revenue.

- Chapter 6 presents the results of Scenarios 9, 10, and 11, including traffic, gross toll revenue, operation and maintenance costs, preliminary capital cost estimates, and net toll revenue.

- Chapter 7 summarizes the findings and presents the results in matrix tabulation for comparison purposes.